

Executive Summary

The Elliott Bay/Duwamish Restoration Program (EBDRP) was established to implement the requirements of a 1991 Consent Decree defining the terms of a settlement for natural resource damages. The goals of the EBDRP include remediation of contaminated sediment associated with Metro (previously Municipality of Metropolitan Seattle and now King County Department of Natural Resources [KCDNR]) and City of Seattle (City) combined sewer overflows (CSOs) and storm drains (SDs).

This Cleanup Study Report addresses contaminated sediment associated with the KCDNR Duwamish CSO outfall and the nearby City Diagonal Way SD/CSO outfall (Duwamish/Diagonal outfalls), both of which are either historic or current discharges to the Duwamish Waterway in Seattle, Washington. A small primary treatment plant rated at about 8 MGD was first operated by the City (1940-1961) and then Metro (1962-1969) and discharged upstream of these outfalls for about 30 years until it was closed in 1969.

Site assessment activities included identification of contaminants of concern, delineation of the extent and magnitude of sediment contamination around the outfalls, as well as evaluations of CSO-reduction measures and watershed source controls within the study area. As part of this effort, KCDNR performed three rounds of sediment sampling and analysis between August 1994 and September 1996. Recontamination modeling based on these data was performed during this period by KCDNR and during mid-1999 by WEST Consultants. Information presented in this Report is used to refine the final cleanup area and assist in the selection and design of sediment cleanup alternatives.

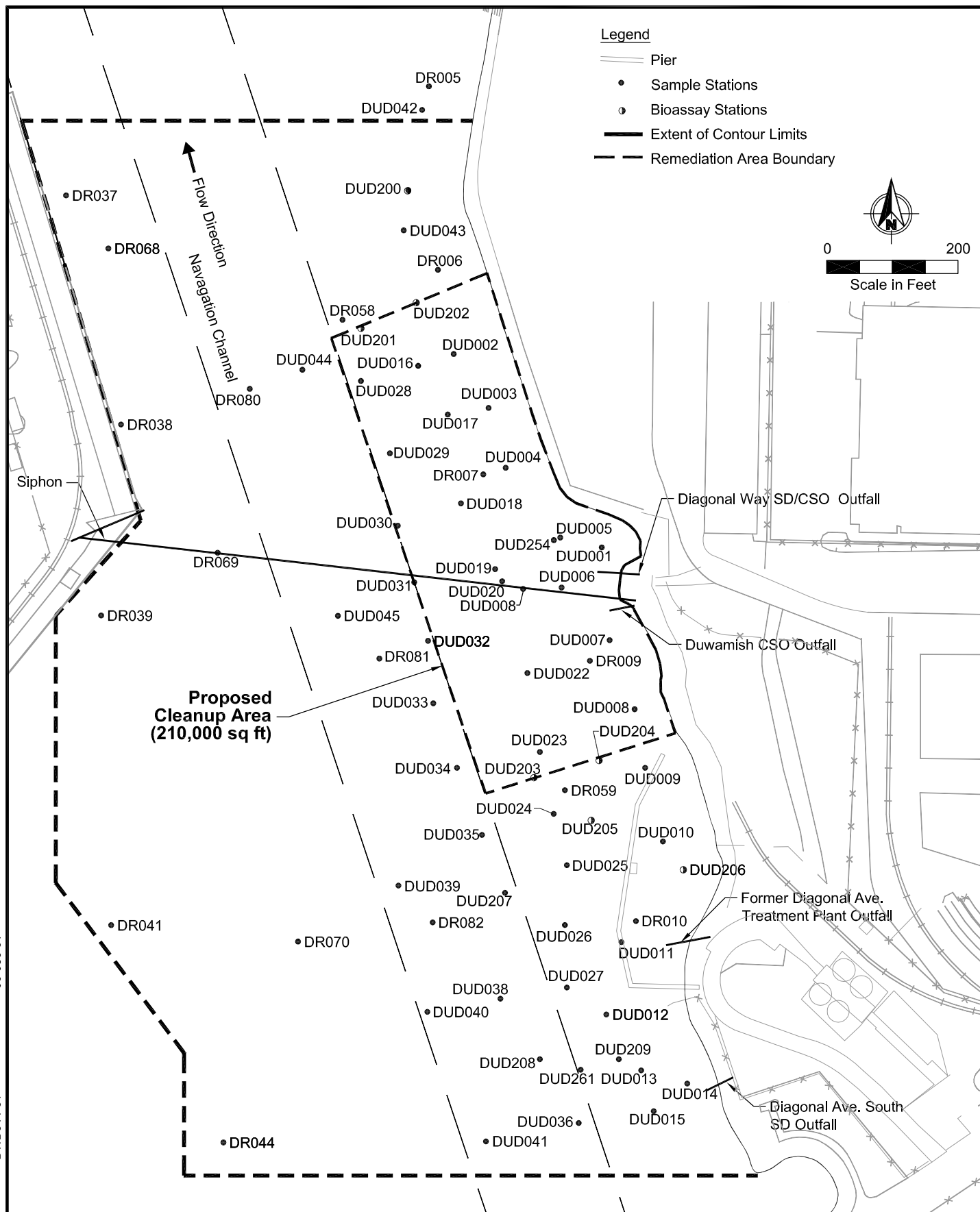
Major conclusions of this Cleanup Study Report are:

- CSO discharges from the Duwamish CSO outfall are controlled to less than one overflow event per year. None are known to have occurred since 1989. CSO discharges from the Diagonal Way SD/CSO outfall historically exceeded 300 million gallons per year (MGY) and continue to average over twenty events per year with a total annual CSO discharge volume estimated to be about 65 MGY.
- Stormwater currently discharges through the Diagonal Way SD/CSO outfall from both the Diagonal and Hanford Drainage Basins, with a combined drainage area of 1,583 acres. This outfall contributes a significant quantity of water to the Duwamish River during storm events, with an estimated discharge volume of 1,230 MGY.
- Watershed source control efforts being implemented or planned in the Diagonal/Hanford Drainage Basin by City Drainage and Wastewater Utility staff include storm drain sediment removal, business inspections, public education, response to citizen complaints, and tracking the source of a recurrent oil sheen.
- The major chemicals of concern found in sediment in the study area near the Duwamish/Diagonal outfalls are PCBs, mercury, bis (2-ethylhexyl) phthalate, and butyl

benzyl phthalate. A phthalate “hot spot” is present directly in front of the Diagonal SD/CSO outfall, but there is a band of elevated phthalate surface concentrations that extends upstream and downstream. Bioassay testing at stations located 350 to 500 feet from the outfall showed no toxicity to three bioassay tests even though these stations had elevated levels of phthalates.

- A rectangular cleanup boundary was established for the site based on the following conditions: 1) setting the western cleanup boundary to the physical limits imposed by the navigation channel; 2) setting the northern cleanup boundary to stations exhibiting no exceedances of sediment bioassay criteria; 3) setting the southern cleanup boundary to stations exhibiting no exceedances or limited exceedances (less than CSL) of sediment bioassay criteria; and 4) setting the eastern cleanup boundary to the shoreline. The encompassed area is estimated at 4.8 acres (approximately 210,000 square feet, **Figure ES-1**).
- Depth of sediment contamination is variable. Sediment core data indicate that concentrations exceeding sediment criteria extend to depths of 3 to 9 feet, depending on the particular chemical and core location. In addition, some chemicals (e.g., PCBs) show increasing concentrations with depth near the outfalls.
- Recontamination modeling performed by KCDNR in 1997 indicated that recontamination by bis (2-ethylhexyl) phthalate from stormwater could occur, but this would be limited to the area near the outfalls.
- A mass balance model by WEST Consultants (1999) suggests that, even with nearly total source control of the phthalate discharges, there would potentially be SQS exceedances produced solely by the background concentrations of phthalates in suspended particulate matter in the study area.
- The data from King County and EPA studies indicate a localized area of PCBs in the general Duwamish/Diagonal study area. This localized area suggests using PCBs as the primary chemical of concern rather than phthalates. PCBs are primary chemicals of concern for the Duwamish River sediment because these chlorinated compounds bioaccumulate in organisms and represent both human health and ecological risks. Removal of PCB “hot spots” in sediment is a priority for regulatory agencies and the tribes.
- Current discharge pipes are not a significant source of PCBs.
- The greatest threat of PCB recontamination in the study area is from potential dredging activities that disturb and mobilize existing PCB-contaminated sediments. Efforts should be made to minimize recontamination potential by coordinating when and how dredging projects are carried out in this section of the river.
- The 4.8-acre area in front of the Duwamish/ Diagonal outfalls was selected as the proposed remediation site for the EBD RP program and does not include a chemical “hot spot” located upstream near the former Diagonal Treatment plant outfall. That area will be addressed under future Superfund activities in the lower Duwamish River.

- Site constraints affecting cleanup feasibility were enumerated, and a screening-level natural recovery/ recontamination model was run for PCBs. The model indicated that natural recovery would not occur in an acceptable time frame (10 years), dredging could release contaminated sediments, and that cleanup would accelerate recovery to below the SQS within a 5 to 10 year period.
- Potential remedial technologies were screened and appropriate technologies were combined into remedial alternatives. The alternatives were then evaluated and compared, with a dredging and capping alternative that results in no change to existing elevations selected as the preferred alternative.
- The preferred alternative removes 42,500 cubic yards (cy) of sediment with a clamshell dredge and sends it to an off-site facility; the exact facility is not yet determined. Following dredging, the remediation site will be capped with clean backfill material (42,500 cy) to isolate remaining sediment contamination from the environment. The final design will utilize USACE and EPA guidance documents for designing isolation caps.
- Compliance monitoring would be performed following the completion of the remedial action to ensure the continued effectiveness of the cleanup remedy.
- The preferred alternative was preliminarily identified as the option that uses permanent solutions to the maximum extent practicable. Public comments received could modify the cleanup analysis and/or preferred alternative presented herein.



EcoChem Team

Duwamish/Diagonal Sediment Remediation Project

Final Focus Area

Figure ES-1

00-086-01

DWD044-01

12/18/01